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Original Research Article

Study of Variations in the Bifurcation of Brachial Artery in Maharashtra Population (Cadaveric Study)

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Conflict of interest: Nil

Abstract

Background: The brachial artery is a continuation of the axillary artery that usually bifurcates opposite to the neck of the radius in the cubital fossa. Variation in the position of bifurcation may be injured by a surgeon's knife; hence, knowledge of the position of bifurcation of the brachial artery is essential to a clinician or surgeon.

Method: 30 male cadavers were studied. The length of the upper limb is measured from the acromion process to the tip of the middle finger of the cadaver. The position of bifurcation was measured from the olecranon process of the humerus. Both measurements were carried out by tailor's tape.

Results: The mean values of the length of the upper limb and the position of the brachial artery have a significant p-value when both parameters are correlated.

Conclusion: The present metrical correlative coefficient study between the length of the upper limb and the position of the brachial artery is an important tool or method for surgeons to approach the cubital fossa without injury to the brachial artery and its branches.

Keywords: Tailorstape, bifurcation, acromionprocess, olecranonprocess.

Introduction

The brachial artery is the main artery of the arm and forearm. It is the continuation of the axillary artery beyond the lower border of the teres major muscle. It usually divides in the anterior cubital fossa opposite to the neck of the radius. It bifurcates into the radial and ulnar arteries [1]. Its position of bifurcation varies in the cubital fossa, leading to confusion for clinicians recording blood pressure.

Moreover, there may be aneurysms, arteriovenous fistulae, or drainage of abscess from the cubital fossa [2]. Amputation at the level of the cubital fossa in the traumatic fracture, or thrombo-anginitic obliterans (TAO), the knowledge position of the bifurcation of the brachial artery plays a vital role to avoid injury to the brachial artery [3] and its branches, which may lead to alarming emergency. Hence, to avoid such emergencies, an attempt is made to study the position of bifurcation of the brachial artery, which is correlated to the length of the upper limb, so that by knowing the length of the upper limb, a clinician or surgeon can protect the brachial artery from any surgical injuries [4].

Material and Method

30 (thirty) male dissected cadavers preserved in the dissection theater of Vedantaa Institute of Medical Sciences Dhundalwadi Dahanu, Palghar (dist), Maharashtra-401606 were studied.

Inclusion Criteria: A well-preserved and dissected, clearly visible brachial artery is selected for study.

Exclusion Criteria: Pathological cadavers, torn brachial arteries and their branches, and detached upper limbs were excluded from the study.

Method: The length of the upper limb of both sides was measured, and a measurement was taken (from the tip of the acromion process of the scapula to the middle finger of the cadaver). Bifurcation of the brachial artery was measured from the epicondyle of humerus to the bifurcation of the brachial artery. These measurements were taken from a tailor's tape.

The duration of the study was from April 2024 to May 2025.

Statistical Analysis: Length of upper limb (acromion process to middle finger of cadaver). The position of the brachial artery (from the olecranon process of the humerus to the bifurcation of the brachial) measurements were note from both

sides of the upper limb, and a correlative coefficient study between these measurements was carried out. The statistical analysis was carried out using SPSS software.

Observation and Results

Table 1: Average length of right and left side upper limb and length of bifurcation of brachial artery from Epicondyle of humerus in male cadavers

- 76.64(±0.30) length of right side upper limb, 4.28 (±0.01) length of position bifurcation of brachial artery.
- 3.60 (± 0.34) length of left upper limb, 4.27 (± 0.03) length of position of bifurcation of brachial artery.

Table 2: Correlative coefficient of right upper limb with position of bifurcation of brachial artery 0.72 correlation coefficient t=5.84 and p<0.001.

Table 3:

Correlative coefficient of left upper limb with position brachial artery bifurcation 0.83 correlation coefficient t=8.46 and p<0.001.

Table 1: Average length of right and left side upper limb and length of bifurcation of brachial artery from Epicondyle of Humerus in male cadavers

Side of the limb	Length of the limb (cms)	Length of position of Bifurcation of Brachial Artery
Right side	73.64 (± 0.39)	4.28 (± 0.01)
Left side	73.60 (± 0.34)	4.27 (± 0.03)

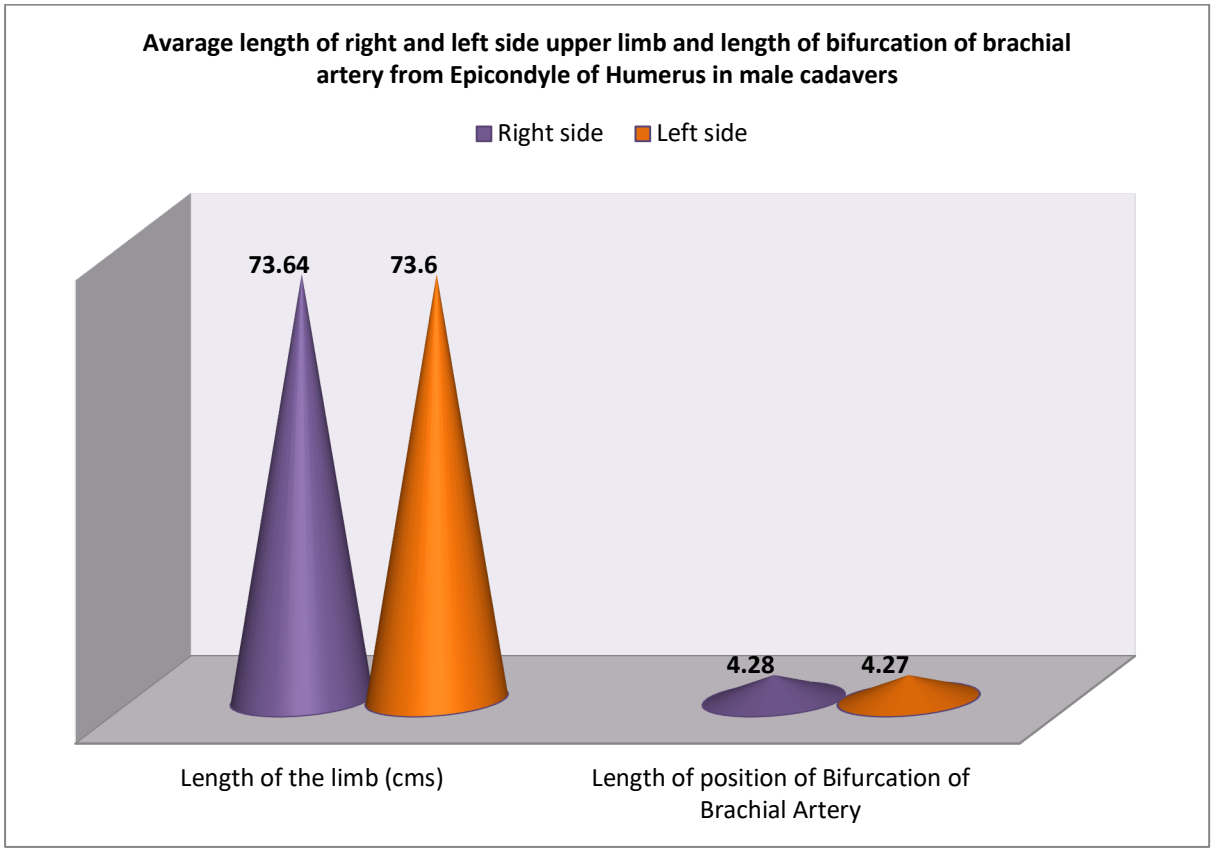

Figure 1: Avarage length of right and left side upper limb and length of bifurcation of brachial artery from Epicondyle of Humerus in male cadavers

Table 2: Correlative coefficient of right upper limb with position of brachial artery from Epicondyle of humerus in Male cadevers

Correlation coefficient:	0.72
Test statistic:	t=5.84 P<0.001

Table 3: Correlative coefficient of left upper limb with position of brachial artery from Epicondyle of humerus in Male cadevers

Correlation coefficient:	0.83
Test statistic:	t=8.46 P<0.001

Discussion

Present study of variations in the bifurcations of the brachial artery in Maharashtra population. The length of the right-sidelimbis 73.64 (±0.39), and 4.28(±0.01) length of the bifurcation artery from the olecranon process of humerus 73.60 (± 0.34) length of the left upper limb, 4.27 (± 0.03) length of the bifurcation of the brachial artery from the olecranon process of humerus (Table 1). The correlative coefficient of the length of the right upper lobe with the length of the position of the brachial artery bifurcation was 0.72, the t test was 5.84, and $p<0.001$ (the p-value was highly significant) (Table 2). The correlative coefficient of the length of the left upper limb and the length of bifurcation of brachial artery position was 0.83, the t-test was 8.46, and $p<0.001$ (the p-value was highly significant) (Table3). These findings are more or less in agreement with previous studies [5,6,7].

These variations could be due to the arterial system of the body seeking the shortest and most direct course to reach their objective; that course is partly determined by mechanical convenience. The main arteries of the limbs run along the flexor surfaces, where they are less likely to be exposed to tension in movement of the adjacent joints. They avoid passing though actual muscular tissue which would compress, them during contraction. Hence, they bifurcate to avoid tension created by joint and muscular contraction as well. Moreover, the angle at which branches leave the main artery depends to a consider able extent on hemodynamic pressure [8]. In addition to that, the brachial artery is a muscular or medium-sized artery. Hence, it can be hypothesized that the muscular tissue in their walls enables them under the influence of the autonomous nervous system [9]. Contract and dilate and so regulate the distribution of blood to the areas that they supply, and whenever there is more demand or more area to be supplied, hence bifurcation might have occurred to meet the challenge of blood supply to larger areas. This study of variation of bifurcation will be quite useful for internal arteriovenous puncture to access the bloodstream. Moreover, following injury of the arm, particularly of the elbow joint, injury to the brachial artery. Hence, bifurcation has surgical importance too [10].

Summary and Conclusion

The present study of variation in the bifurcation of the brachial artery will be useful to orthopedicians, physicians, cardiologists, radiologists, and anato mists too. But this study demands further genetic, embryological, nutritional, and biomechanical studies because of the exact mechanism of formation of angioplastic cells in fetal life is still unclear.

Limitation of study:

Owing to remote location of research centre, small number of cadavers lack of latest techniques we have limited finding and results.

This research work was approved by the ethical committee of Vedanta Institute of Medical Sciences Dhundalwadi, Dahanu, Palghar (dist), and Maharashtra-401606.

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